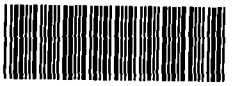

SDMS DocID 2095146

FILE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

January 30, 2006

Mr. Frank Natitus
Arcadis G&M, Inc.
6 Terry Drive
Suite 300
Newtown, PA 18940

RE: BALLY GROUND WATER CONTAMINATION SUPERFUND SITE

Mr. Natitus:

The United States Environmental Protection Agency (EPA) is in receipt of the Revised Facility Vapor Intrusion Investigation Supplemental Workplan ("workplan"), which Arcadis G&M, Inc. (Arcadis) has prepared for the Bally Ground Water Contamination Superfund Site (Site). The workplan is dated January 25, 2006, and was prepared on behalf of Sunbeam Products, Inc.

The purpose of this letter is to approve the workplan

This approval does not constitute a stated or implied agreement with every statement of fact, characterization, opinion, or conclusion contained in the workplan, or other documents related to that document. Statements made by Arcadis do not necessarily reflect the opinions or conclusions of EPA. The absence of a response or comment by EPA with respect to any particular statement contained in the workplan or related documents shall not be deemed as EPA acceptance of, or agreement with, that statement.

At your earliest convenience, please contact myself and Mr. Asuquo Effiong of the Pennsylvania Department of Environmental Protection with a schedule to perform the investigative activities outlined in the workplan. Please contact me if you have any questions regarding this project at (215) 814-3286.

Sincerely,

Mitch Cron, RPM
Western PA/MD Remedial Branch

Cc: Asuquo Effiong, PADEP
Chris Ann Gahagan, EnLibra LLC

ARCADIS
Infrastructure, environment, buildings

ARCADIS G&M, Inc.
6 Terry Drive
Suite 300
Newtown
Pennsylvania 18940
Tel 267 685 1800
Fax 267 685 1800
www.arcadis-us.com

Mitch Cron
USEPA Region III
Hazardous Site Cleanup Division (3HS22)
1650 Arch Street
Philadelphia, PA 19103

ENVIRONMENT

Subject:
Revised Facility Vapor Intrusion Investigation Supplemental Workplan
Bally Groundwater Contamination Superfund Site
Former Bally Engineered Structures Facility, Bally, Pennsylvania

Date:
25 January 2006

Contact:
Frank C. Natitus

Phone:
267.685.1800

Email:
fnatitus@arcadis-us.com

Our ref:
NP000597.0006

Dear Mr. Cron:

On behalf of Sunbeam Products, Inc. (Sunbeam), ARCADIS G&M, Inc. (ARCADIS) has prepared this revised Supplemental Workplan (Workplan) to complete additional vapor intrusion assessment at the former Bally Engineered Structures (BES) facility (**Figure 1**). The Workplan was prepared as a result of the August 9, 2005 meeting between Sunbeam and the United States Environmental Protection Agency (USEPA) and the June 30, 2005 report prepared by ARCADIS on behalf of Sunbeam entitled *Facility Subslab Vapor Analytical Results*. In addition, the revised workplan addresses the comments in the USEPA letter dated January 5, 2006 and subsequent conference call between the USEPA, Sunbeam and ARCADIS on January 19, 2006

Project Scope and Objective

The proposed investigation included in this Workplan is designed to further evaluate former BES facility to identify any potential vapor intrusion of site-related Constituents of Potential Concern (COPCs).

The facility investigation will include the following tasks related to characterizing potential vapor intrusion:

- Collect indoor air quality (IAQ) samples at eight locations within the facility;
- Collect corresponding subslab vapor (SV) samples at each of the seven locations (one IAQ sample will be collected on the first floor above a basement);
- Compare IAQ results to the Region 3 Risk Based Concentrations (RBC) for ambient air;
- Collect two ambient air samples outside of the facility; and
- Report the results to the USEPA.

The purpose of the facility investigation is to identify areas where vapor intrusion may pose a potential health concern to facility workers and to determine if additional investigation and/or remediation may be required.

Background

The former BES facility is located on the southwestern edge of the Borough of Bally, Berks County, Pennsylvania (**Figure 1**). Chlorinated solvents were used at the facility as part of the former manufacturing operations. Historical releases of these solvents impacted groundwater beneath the facility.

In 2003, USEPA requested facility characterization activities with respect to the risks posed by the potential for vapor intrusion beneath the facility. In October 2003, Sunbeam submitted a workplan to the USEPA to conduct subslab vapor sampling at the facility. This workplan was approved by the USEPA and the subslab vapor sampling was completed in March 2004. The results of this investigation were submitted to the USEPA in May 2004. The USEPA provided comments on the results and a workplan for additional investigation was submitted to the USEPA in March 2005. The March 2005 workplan was approved and the additional investigation was completed in March 2005. The results of this investigation were submitted to the USEPA in June 2005. The USEPA issued a comment letter on July 25, 2005. On August 9, 2005, Sunbeam, ARCADIS and the USEPA met to discuss the next phase of investigation for the facility. This Supplemental Workplan addresses the next steps discussed during that meeting.

March-April 2004 Vapor Intrusion Sampling

Four subslab vapor samples (SV-1 through SV-4) were collected from locations within the former BES facility in March and April of 2004. The sample locations are shown on **Figure 1** and were selected based on historical operations and/or soil sample results that would represent the potential worst case scenario. The analytical results of this investigation are presented on **Figure 1**. TCE concentrations in subslab vapor samples collected during the April-March 2004 investigation were as follows:

- SV-1: 130 $\mu g/m^3$
- SV-2: 140 $\mu g/m^3$
- SV-3: 13,000 $\mu g/m^3$
- SV-4: 6,100 $\mu g/m^3$

March 2005 Vapor Intrusion Sampling

Five subslab vapor samples (TG-1 throughTG-5) were collected at the facility during March 2005. The sample locations are shown on **Figure 1** and were selected based upon historical operations at the facility, USEPA comments and the results of the March 2004 sampling activities. The analytical results of this investigation are presented on **Figure 1**. TCE concentrations in subslab vapor samples collected during the March 2005 investigation were as follows:

- TG-1: 17,000 $\mu g/m^3$
- TG-2: 290 $\mu g/m^3$
- TG-3: 9.6 $\mu g/m^3$
- TG-4: 2.0 $\mu g/m^3$
- TG-5: 39,000 $\mu g/m^3$

Current Site Conditions

The former BES facility currently is used by twelve different companies conducting operations or storage activities on the premises. These activities are conducted in three buildings, one of which is composed of three different areas. Therefore, for the purpose of this investigation, the facility has been divided into five "work spaces" or building types as shown on **Figure 1**.

- AREA 1 (Large Warehouse Area) - Based upon previous reports, the south west portion of this area was formerly used as a lagoon/surface water impoundment. Presently the large warehouse area is occupied by the following operating companies:
    - Impress Industries;
    - L+Z Public Storage; and
    - Hunsinger Plastics.
- AREA 2 (Older Warehouse Area) - The occupied portion of this facility is presently used as a storage area for safety supplies. The occupants of this portion of the facility include:
    - Stauffer Glove; and
    - Ram Motors (listed as occupant, space is presently unoccupied).

Ram Motors is a separate building of similar construction and age as Stauffer Glove.

- AREA 3 (Former Plant Area) - Based on previous reports, the former degreasing area was located in this vicinity. The following businesses operate in this portion of the facility:
    - Great American Weaving Corporation (GAWC); and
    - Gregory Woodworking.

These two businesses are separated by a wall with a man door connecting the two areas.

- AREA 4 (Back Building) - Based on previous reports, potential historic source areas have not been identified in the northwest warehouse building. The businesses operating in this area include:
    - T&G Packaging; and
    - S&W Metals.

Both of these businesses operate in the Northwest building which is separated into three segments by large bay doors that normally are left open. Additionally, large bay doors allowing access to the outside of the building are often left open allowing free exchange of indoor air with fresh outside air.

- AREA 5 (Office Building) - Based upon previous reports, the basement of the office building overlies an area where lagoons or pits formerly existed. Approximately two thirds of the building is slab on grade construction and the other one-third has a basement. The businesses operating in this area include:
    - Condict and Co.;
    - Hunsinger Plastics (office); and
    - Curves (workout center).

An overview of general construction for the buildings is provided below. The information was collected during a site visit by ARCADIS and the USEPA in 2004.

- Manufacturing and Storage Areas - The manufacturing and storage areas contain competent concrete floors, have ceiling heights ranging from approximately 15 to 25 feet, generally are not insulated, and are heated using direct vent natural gas-fired units. Ventilating fans were also noted in several

areas of the building. Large bay doors are located in each of these areas to provide ready access to the building. It should be noted that several sections of the floor have tongue and groove wood flooring over the concrete floor as indicated on **Figure 1**.

- Office Areas – The office areas consist of improved areas that have carpeted/tiled floors, finished wall systems, and drop ceilings. Heating and air conditioning are provided by a central forced air system and/or direct vent window/wall units. Ceiling heights are approximately 8 to 10 feet.

- Basement – There is only one basement area located at the site which is located beneath the office building as shown on **Figure 1**. None of the other buildings have basements. The basement in the office area encompasses approximately one-third of the office building footprint. The basement has a competent concrete floor and contains two sealed sumps that collect water and pump it to grade level.

Proposed Investigation Activities

The following sections provide an overview of the work planned to further evaluate the potential for COPCs present in the subsurface to migrate into indoor air within the work areas. Five areas of the Site have been identified for sampling. The areas are outlined below and the portions occupied by the various companies are shown on Figure 1.

A phased approach will be used on site to further evaluate the potential for vapor migration from the subsurface to indoor air.

An initial facility and work space area walk through will be conducted by ARCADIS personnel. Once the area to be sampled is identified, any utilities will be identified and marked. This precaution will be followed for each of the seven work spaces.

It should be noted that due to the size and openness of the warehouse and manufacturing areas, very little pressure differential would be expected between the subsurface and indoor spaces. In addition, the air exchange rates in some portions of the facility are assumed to be high due to the presence of large fans and open bay doors. The combination of these factors would be expected to lessen the convective forces, thereby reducing the expected vapor migration into many areas of the facility.

Sample Location and Rationale

Sample locations for the subslab vapor and IAQ were selected based on several factors including: previous investigation results, building usage, slab condition, building/area size, and expected air exchange rate. The general site layout, including the different building use areas and proposed sampling locations, is presented on

Figure 1. The following points identify the various areas of the facility and the number of IAQ and SV samples to be collected in each area:

- AREA 1 - Large Warehouse Area (IAQ-1/SV-4B, IAQ-4/SV-5, SV-9 and SV-10) - Previous samples collected in Area 1 have indicated concentrations of TCE between 6,100 and 17,000 $\mu g/m^3$ at the southwest portion of the Impress Industries space. SV-9 and SV-10 have not been previously assessed, but are located in the vicinity of the former northern lagoon area and former small parts degreasing area, respectively

- AREA 2 - Older Warehouse Area (IAQ-2/SV-3B) - Previous TCE detections of 240 and 13,000 µg/m3 have been observed in the Stauffer Glove portion of the facility.

- AREA 3 - Former Plant Area (IAQ-7/SV-5) – Gregory Woodworking has not been previously assessed.

- AREA 4 - Back Building (IAQ-5/SV-6 and IAQ-6/SV-7) - Based on previous reports (CEC, various), potential historic source areas have not been identified in the northwest warehouse building. However concentrations of site related VOCs above the screening levels were detected in a subslab vapor sample (TG-5) collected from this area in March of 2005.

- AREA 5 - Office Building (IAQ-3A in basement & IAQ-3B upstairs and SV-8). Based upon reports previously issued by CEC the basement of the office building overlies an area where lagoons or pits formerly existed. Sample location IAQ-3 has been selected to assess the presence of any contaminants that may have been present in this area. The building consists of a basement and a main level. A sample was collected from the basement area in March 2005 that indicated a subslab vapor concentration of TCE less than 10 ppbv. Sample IAQ-3A will include an IAQ sample and a subslab vapor sample. Sample location IAQ-3B will be an IAQ sample on the main floor above the location of IAQ-3A.

In total nine subslab vapor samples, eight indoor air samples, and two ambient air samples will be collected during this sampling event. The ambient air samples will be collected first from locations approximately upwind and downwind of the facility. The final locations of these samples will be defined based upon the wind direction at the time of sampling. Duplicates will be collected as defined in the vapor intrusion workplan for the previous phase of work (March 2005).

Sampling Methodology and Analysis

Subslab vapor, indoor air and ambient air samples will be collected in accordance with the SOPs provided in Attachment 1. Portions of the procedures, such as

checking initial and final vacuums are dictated by laboratory procedure. In addition to the SOPs an Indoor Air Quality Building Survey and an Indoor Air Quality Sample Log are provided in Attachment 2.

The indoor air, ambient air, and subslab vapor samples collected from the facility will be submitted to Air Toxics Limited for gas chromatography/mass spectroscopy (GC/MS) analysis by modified TO-15 for the following compounds:

Chemical	CAS No.	Low-Level (ppbv)[a]	SIM (ppbv)[a]
Vinyl Chloride	75-01-4	0.1	0.01
1,1-Dichloroethane	75-34-3	0.1	0.02
1,1-Dichloroethylene	75-35-4	0.1	0.01
cis-1,2,-Dichloroethylene	156-59-2	0.1	0.02
1,1,1-Trichloroethane	71-55-6	0.1	0.02
Trichloroethylene	79-01-6	0.1	0.02

[a] Reporting Limits for Air Toxics Laboratory located in Folsom, California.

Subslab vapor samples will be analyzed by the low-level TO-15 method and indoor/ambient air samples will be analyzed by the SIM TO-15 method. All results will be reported to the Reporting Limit. Concentrations presented in parts per billion volume will be converted to micrograms per cubic meter using the following equation:

$$ug/m^3 = ppbv \times molecular\ weight\ (grams) \div 24.45$$

where 24.45 = molar volume of air in liters a normal temperature and pressure conditions (i.e., 25°C and 760 torr).

Quality Assurance Project Plan

QA/QC procedures will follow the procedures set forth in the approved Workplan dated March 2005. The QA/QC section of the March 2005 Workplan addresses sample QA/QC procedures, including the collection of QC field samples, sample handling, and maximum holding times.

Data Evaluation

The indoor air analytical results will be compared to the subslab vapor analytical results and to the ambient air analytical results to evaluate the potential for interference due to ongoing site operations and background. The indoor air analytical results will then be compared to the Region 3 RBC table. Recommendations for future actions will be proposed, as appropriate, based on the results of the investigation in the summary report.

Reporting and Schedule

Following USEPA approval of this Supplemental Workplan and after access is obtained from the site owner, assessment at the facility will commence. An anticipated schedule for the investigation will be provided under separate cover following approval of the Workplan. Specific activities required to complete the assessment include:

- Site owner approval of access and sampling locations;
- Utility clearance, sample collection, and sample analysis; and
- Data evaluation and validation.

A summary letter presenting the data will be submitted to the USEPA following receipt and evaluation of the analytical results. ARCADIS anticipates report submittal to the USEPA within 90 days of the study implementation.

Sincerely,

ARCADIS G&M, Inc.

Christopher T. Sharpe
Staff Scientist

Frank C. Natitus, P.E.
Senior Engineer

Copies:
L. Borland
C.A. Gahagan
D. Wisbeck
M. Bedard

Attachments

SV-2	4/7/2004
Trichloroethene	140
1,1-Dichloroethene	180
1,1-Dichloroethane	2.1
cis-1;2-Dichloroethene	3.6
1,1,1-Trichloroethane	560
Vinyl Chloride	< 0.14

SV-1	4/7/2004
Trichloroethene	130
1,1-Dichloroethene	500
1,1-Dichloroethane	1.1
cis-1,2-Dichloroethene	0.89
1,1,1-Trichloroethane	260
Vinyl Chloride	< 0.23

TG-5	3/23/05
Trichloroethene	39,000
1,1-Dichloroethene	79,000
1,1-Dichloroethane	<120
cis-1,2-Dichloroethene	<36
1,1,1-Trichloroethane	<48
Vinyl Chloride	<22

TG-3	3/24/05
Trichloroethene	9.6
1,1-Dichloroethene	<0.063
1,1-Dichloroethane	<0.13
cis-1,2-Dichloroethene	<0.14
1,1,1-Trichloroethane	0.95
Vinyl Chloride	<0.04

TG-1	3/23/05
Trichloroethene	17,000
1,1-Dichloroethene	34
1,1-Dichloroethane	<35
cis-1,2-Dichloroethene	<35
1,1,1-Trichloroethane	<48
Vinyl Chloride	<22

SV-4	4/7/2004
Trichloroethene	6,100
1,1-Dichloroethene	< 22
1,1-Dichloroethane	< 70
cis-1,2-Dichloroethene	< 22
1,1,1-Trichloroethane	< 67
Vinyl Chloride	< 14

SV-3	4/7/2004
Trichloroethene	13,000
1,1-Dichloroethene	< 53
1,1-Dichloroethane	< 54
cis-1,2-Dichloroethene	< 53
1,1,1-Trichloroethane	< 73
Vinyl Chloride	< 34

TG-2	3/22/05
Trichloroethene	290
1,1-Dichloroethene	<0.72
1,1-Dichloroethane	<0.74
cis-1,2-Dichloroethene	<0.72
1,1,1-Trichloroethane	<1.0
Vinyl Chloride	<0.47

TG-4	3/22/05
Trichloroethene	2
1,1-Dichloroethene	<0.071
1,1-Dichloroethane	<0.14
cis-1,2-Dichloroethene	<0.14
1,1,1-Trichloroethane	0.29
Vinyl Chloride	<0.046

DOGWOOD STREET

IAQ-6/SV-7

S&W METALS, INC.
FORMER BES FACILITY

IAQ-5/SV-6
T.G. PACKAGING INC.

TG-5

SV-2

FORMER TEST COOLERS

SV-1

AREA OF FORMER OVERHEAD TANKS

SV-9
FORMER BES FACILITY
IMPRESS INDUSTRIES

L&Z PUBLIC STORAGE

IAQ-4/SV-5

IAQ-2/SV-3B
SV-3

GREAT AMERICAN WEAVING CORP.

RAM MOTORS & CONTROLS

TG-2
STAUFFER MFG. CO., INC.

TG-4

GREGORY'S WOODWORKING

IAQ-7/SV-5

APPROXIMATE LIMIT OF ASPHALT

4TH

IAQ-1/SV-4B

TG-1

SV-4

TG-3

IAQ-3A & 3B/SV-8

HUSINGER PLASTICS

SV-10

CURVES

CONDICT AND CO.

HUNSICKER OFFICE

OFFICE AREA BASEMENT

SEE INSET A

ROUTE 100

IAQ-2/SV-3B
SV-3

TG-2

TG-4

IAQ-7/SV-5

0 50
SCALE: 1"=50'

INSET A

LEGEND:

- IAQ-2⊠ PROPOSED INDOOR AIR QUALITY SAMPLING LOCATION
- SV-7 ⊠ PROPOSED SUBSLAB VAPOR SAMPLING LOCATION
- TG-3⊠ SUBSLAB VAPOR AND TRACER GAS SAMPLE LOCATION (MARCH 2005)
- SV-1⊠ SUBSLAB VAPOR SAMPLE LOCATION (MARCH/APRIL 2004)
- STREAM
- V VENT OR VENT FAN
- H OVERHEAD HEATING UNIT
- S SPRINKLER LINE THROUGH FLOOR
- W WATER LINE
- WOOD FLOOR UNDERLAIN BY CONCRETE
- STORM DRAIN
- S SUMP

NOTE:

ALL CONCENTRATIONS IN ug/m^3

NO.	DATE	REVISION DESCRIPTION	BY CKD

SUNBEAM PRODUCTS, INC.
BALLY GROUNDWATER SITE

BALLY BOROUGH
BERKS COUNTY, PENNSYLVANIA

FORMER BES FACILITY
PROPOSED SUBSLAB VAPOR AND INDOOR AIR SAMPLING LOCATIONS

0 120
SCALE: 1"=120'

ARCADIS
6 Terry Drive
Suite 300, Newtown, Pa 18940
Tel: 267/685-1600 Fax: 267/685-1601

PROJECT MANAGER	DEPARTMENT MANAGER
M. BEDARD	M. BEDARD
LEAD DESIGN PROF.	CHECKED
F. NATITUS	F. NATITUS
DRAWN	DATE
M. WASILEWSKI	10/1
PROJECT NUMBER	DRAWING NUMBER
NP000597.006	AR100320 1

ARCADIS

Attachment 1

Standard Operating Procedures

STANDARD OPERATING PROCEDURE NO. 1

Chain-of-Custody Procedures

Scope: This procedure describes the Chain-of-Custody used to establish the necessary documentation to track sample possession from time of collection to analysis.

Purpose: The purpose of this procedure is to develop and maintain good quality control in field operations and uniformity between field personnel involved in the documentation of samples for shipment.

Equipment: Chain-of-Custody Record and Chain-of-Custody Seals

Procedure:

Prior to leaving the sampling site and/or prior to sealing sample cartons or coolers for shipment, the Chain-of-Custody Record must be completed.

Information to be provided on this form includes:

1. Project number and Location
2. Laboratory Identification
3. Sampling Party
4. Sample Identification (sample number)
5. Sample Bottle/Container Description
6. Date of Sampling
7. Signature of Persons including Chain-of-Custody and Dates and Times of Possession
8. Delivery Method (attach shipping bill)

Once the container is ready for shipment, Chain-of-Custody Seals shall be applied to the cooler in such a manner as to monitor tampering.

Upon change of possession, the record is to be signed and dated by both parties. The white (original) copy accompanies the shipment, the field sampler retains the yellow copy.

STANDARD OPERATING PROCEDURE NO. 2

Air/Vapor Sample Packaging and Shipment

Scope: This procedure describes acceptable methodology for packaging and shipping air/vapor samples to an analytical laboratory for chemical analyses.

Purpose: The purpose of this procedure is to provide a uniform and documented means of securely transporting environmental samples to the laboratory so as to preserve the integrity and quality of the sample(s).

Equipment: Packaging tape, mailing labels, chain-of-custody forms, chain-of-custody seals, and shipping forms.

Procedures:

1. Assemble all sample containers from the completed sampling event.
2. Locate, identify and record type of canister for each sample identification number on a chain-of-custody form.
3. Determine the total container count and cross check sample count.
4. Check to make sure canisters were labeled properly.
5. Place some shock absorbing material in the bottom of the package to prevent direct contact of the container with the bottom of the package.
6. Arrange canister to prevent movement.
7. Place the top copy of the chain-of-custody in package.
8. Close lid and place custody seals over the joint and cover with clear tape.
9. Properly complete and address a shipping form and affix to the lid of the package. Samples should be delivered to the laboratory by the next morning.
10. Deliver to an appropriate overnight courier or the laboratory.
11. File a copy of the chain-of-custody form and the shipping form in the project file.
12. Call laboratory the next morning to confirm arrival of samples.

STANDARD OPERATING PROCEDURE NO. 3

Subslab Soil Vapor Sampling

Scope: This procedure describes the methodology to be used for the collection of subslab soil vapor samples.

Purpose: The purpose of this procedure is to ensure good quality control in field operations, uniformity between different field personnel and to allow traceability of possible cause of errors in analytical results.

Equipment: Hammer Drill; 3/8 in. bit; tedlar bags; peristaltic pump; ¼ inch ID Masterflex tubing; concrete sealant; 6-L Summa™ canister; regulator; barometer

Procedure:

Probe Installation

1. Prior to subslab vapor probe installation, identify and mark utilities coming into the building from the outside (e.g., gas, water, sewer, refrigerant, and electrical lines) and utilities beneath (inside) the building.

2. Core hole through cement slab.

3. Drill an approximately 3/8 inch boring approximately 3 inches into subslab soil.

4. Remove the drill and cover the hole with inert material until the probe is ready to be inserted.

5. Install sampling apparatus (i.e., commercially available soil vapor point and tubing) so that it "floats" in the slab avoiding obstruction with subslab material.

6. Seal boring by creating an air-tight seal around sample tubing at ground surface using an inert material.

7. Check sampling apparatus connections. Note that barbed union fittings should be used for tubing connections. If there is a problem with obtaining fittings, the connections may be sealed using an inert material.

Soil Vapor Collection

1. Record location, date, time, weather, atmospheric pressure, approximate depth of subslab vapor samples, on Soil Vapor Sample Log.

2. Connect Tygon sample tubing to ¼ inch ID Masterflex tubing and a peristaltic pump and 1-L Tedlar bag. Use of a peristaltic pump will ensure that sampled air does not circulate through a pump causing potential cross contamination and leakage.

3. Purge vapor probe by filling two Tedlar bags or routing purge air to the exterior of the building with tubing. A purge volume of 2 L was chosen based on the assumption of a 2-inch sampling interval and an affected sample diameter of 0.61 m (2 ft). Purge rate should be approximately 200 cubic centimeters per minute (i.e., 5 minutes per Tedlar bag).

4. Record purge date and time on Soil Vapor Sample Log

5. Collect subslab vapor samples in evacuated 100 percent sim-certified 6-L Summa™ polished canisters equipped with regulators to control intake rate. Sampling rate should be approximately 200 cubic centimeters per minute. Check vacuum in canisters prior to sampling. At least 4-L of air will be collected in the canister for analysis (i.e. 20 minute collection time at 200 cubic centimeters per minute). Following sample collection, check and record final vacuum in canister. Submit canisters to a commercial laboratory for analysis. Record Sample ID, Date, Time and analysis requested on the Sample Label.

6. Record sample time on Soil Vapor Sample Log.

7. Remove sampling apparatus and seal the borehole annulus with an appropriate sealant to the original surface grade (*note duplicate sample collection method below).*

Duplicate Soil Vapor Sample Collection

1. Note duplicate sample location on Soil Vapor Sample Log.

2. Duplicate samples will be collected using duplicate tees and flow restrictors per laboratory guidance Check vacuum in canisters prior to sampling. At least 4-L of air will be collected in the canister for analysis (i.e. 20 minute collection time at 200 cubic centimeters per minute). Following sample collection, check and record final vacuum in canister. Record Duplicate Sample ID, Date, Time and analysis requested on the Sample Label.

3. Submit canisters to a commercial laboratory for analysis.

STANDARD OPERATING PROCEDURE NO. 5

Indoor Air Quality Sampling

Scope: This procedure describes the methodology to be used for the collection of Indoor Air Quality (IAQ) samples.

Purpose: The purpose of this procedure is to ensure good quality control in field operations, uniformity between different field personnel and to allow traceability of possible cause of errors in analytical results.

Equipment: ¼ inch ID Masterflex tubing; 6-L Summa™ canister; regulator/pressure gauge; barometer, IAQ Sample Log, ARCADIS Form IAQ - 01

Procedure:

Indoor Air Quality Sample Collection

Before Sampling

1. Record location, date, time, weather, atmospheric pressure, canister number, flow controller number, on IAQ Sample Log.

2. Verify gauge operation. Gauge on flow controller should read "zero" before use.

3. Verify initial vacuum of canister per laboratory guidance.

    a. Make sure canister valve is closed.

    b. Remove brass cap from top of canister.

    c. Attach gauge/flow controller to canister.

    d. Attach brass cap to influent side of gauge/flow controller tee fitting.

    e. Open and close valve quickly.

    f. Read vacuum on gauge (Initial vacuum of the canister should be greater than 25 in. of Hg. If it is not call AirToxics client services at 1-800-985-5955 and arrange for replacement). Record gauge reading on "Initial Vacuum" section on chain of custody, IAQ Sample log, and on canister tag.

During Sampling

4. Install flow controller, supplied by AirToxics, to top of pressure gauge.

5. Install approximately 3 – 5 ft. tubing to end of flow controller to assure sample is collected at breathing level.

6. Open valve ½ turn.

7. Record time of sample collection start in IAQ Sample log.

8. Return to collect the sample 8 hours after deploying canister. The sample will be an integrated 8 hour sample. (Note that the flow controllers are set by the laboratory such that some vacuum will remain following the set collection period.)

After Sampling

9. Verify and record final vacuum on IAQ sampling log and on canister tag.

10. Close valve on canister by hand tightening knob.

11. Disassemble pressure gauge and flow controller. Replace brass cap on canister.

12. Complete canister sample tag.

13. Return canisters and sampling apparatus in boxes provided by laboratory.

14. Fill out chain of custody (COC) and place lab. copy of COC in box.

15. Seal box and affix custody seal.

16. Record canister to lab via appropriate shipping method, taking into account canister holding times (14 – 30 days).

Duplicate Indoor Air Quality Sample Collection

1. If a duplicate sample has been collected, note duplicate sample location on IAQ Sample Log.

2. Duplicate samples will be collected using duplicate tees and flow restrictors per laboratory guidance. Check vacuum in canisters prior to sampling. At least 4-L of air will be collected in the canister for analysis. Following sample collection, check and record final vacuum in canister. Record Duplicate Sample ID, Date, Time and analysis requested on the Sample Label.

3. Submit canisters to a commercial laboratory for analysis as described above.

ARCADIS

Attachment 2

Survey and Log Sheets

ARCADIS

Indoor Air Quality Building Survey

Project/No. _____
Date: _____ Personnel: _____
Address/Building No.: _____
Point of Contact: _____
Current Building Type: Residential Commercial Industrial

Building Construction Characteristics:

Ranch	Mobile Home
Raised Ranch	Duplex
Cape	Apartment
Colonial	Condo
Split Level	Other: _____

General Description of Building Materials (e.g., concrete, cinder block): _____

Number of floors in building (including basement): _____

Has the building been weatherized with any of the following
Insulation Energy-Efficient Windows Storm Widows Other _____

Characteristics of basement:

Finished	Floor:	Foundation Walls:	Moisture:
Unfinished	Concrete	Concrete	Wet
	Dirt	Block	Damp
	Other _____	Layed up stone	Dry

Is sump present? Y / N

Does the basement have any of the following characteristics:
Cracks Pipes Utility Conduits Slab drainage Sump pump
Other: _____

Heating and Ventilation System(s) Present:

Type of heating systems(s) used in building:

Hot Air Circulation	Heat Pump	Steam Radiation	Wood Stove
Hot Air Radiation	Unvented Kerosene	Electric Baseboard	Other: _____

Types of Fuel:

Natural Gas	Electric	Coal
Fuel Oil	Wood	Solar

Mechanical ventilation system(s):

Central Air	Mechanical Fans	Bathroom Exhaust	Open Windows
Individual A/C	Kitchen Range Hood	Air-to-Air Heat XCHG	Other: _____

ARCADIS G&M

TRACER VAPOR SAMPLE LOG

Sample ID _____
Date _____
Time _____
Weather _____

Project/No. _____
Sampling Personnel _____
Duplicate ID _____
Barometric Pressure _____
Utility Markout Performed _____

DESCRIPTION OF SAMPLE LOCATION:

Location _____
Facility Former BES
Floor Type _____

Canister Placement Date _____
Canister Placement Time _____
Canister Retrieval Date _____
Canister Retrieval Time _____

Indoor Air		Sub Slab	
Begin Sample Time		Purge Time/Rate	
End Sample Time		Sample Depth	
Sample Volume		Begin Sample Time	
Instrument Reading*		End Sample Time	
Instrument STDEV*		Instrument Reading*	
		Instrument STDEV*	

FIELD PARAMETERS:

Sample Method _____
Sample Description _____
Room Description _____
PID _____
FID _____

CONTAINER DESCRIPTION: From _____ Lab _____ ARCADIS Geraghty & Miller

Container	Analysis

TOTAL: ☐

Utility Markout Location Diagram

Notes:
* includes first two reading (to be discarded)

ARCADIS G&M

INDOOR AIR QUALITY SAMPLE LOG

Sample ID		Project/No.	NP000597.0006.00007
Date		Sampling Personnel	
Time		Duplicate ID	
Weather		Barometric Pressure	
		Corresponding Subslab ID	

DESCRIPTION OF SAMPLE LOCATION:

Location		Cannister Type	
Facility	Former BES	Cannister No.	
Floor Type		Flow Regulator No.	
Cracks?		Pre Sample Vacuum	
Room Dimensions		Begin Sample Time	
Tie Meas.1		Mid Sample Time	
Tie Meas. 2		Mid Sample Vacuum	
Tie Meas. 3		End Sample Time	
Intake Height		End Sample Vacuum	

FIELD PARAMETERS:

Sample Method

Sample Description

PID

FID

CONTAINER DESCRIPTION:

	Container	Analysis
	6L Summa	TO-15
Total		

Location Diagram (Show Ties)

ARCADIS G&M

SOIL VAPOR SAMPLE LOG

Sample ID		Project/No.	NP000597.0006.
Date		Sampling Personnel	
Time		Duplicate ID	
Weather		Barometric Pressure	

DESCRIPTION OF SAMPLE LOCATION:

Location		Cannister Type	
Facility	Former BES	Cannister No.	
Floor Type		Flow Regulator No.	
Cracks?		Pre Sample Vacuum	
Room Dimensions		Sample Depth (ft)	
Tie Meas.1		Purge Time	
Tie Meas. 2		Purge Rate	
Tie Meas. 3		Purge Volume	
		Begin Sample Time	
FIELD PARAMETERS:		End Sample Time	
		End Sample Vacuum	

Sample Method

Sample Description: Sub Slab Vapor

PID

FID

CONTAINER DESCRIPTION:

Container	Analysis
6L Summa	TO-15

TOTAL:

Location Diagram (Show Ties)